CLAIMS

1. An optoelectronic device for acquiring machine-readable symbols, comprising:

a two-dimensional sensor having a plurality of pixels each capable of transmitting electrical signals representing a quantity of light incident on the respective pixel, the pixels arranged in a plurality of rows, the pixels in each of the rows extending in a scanning direction, and the plurality of rows arranged in a direction perpendicular to the scanning direction with respect to one another; and

a scanning control circuit coupled to the two-dimensional sensor to selectively receive electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a first and a second successive pass along the rows, where the sets of the pixels extend across at least one row in a direction perpendicular to the scanning direction, and each set of the pixels has a first height in the direction perpendicular to the scanning direction during the first pass and a second height in the direction perpendicular to the scanning direction during the second successive pass, the second height different from the first height.

2. The optoelectronic device of claim 1 wherein the pixels in at least one row each have a same height dimension in the direction perpendicular to the scanning direction, and the pixels in at least another row each have a same height dimension in the direction perpendicular to the scanning direction, the height dimension of the pixels in the one row different from the height dimension of the pixels in the other row, and wherein the scanning control circuit selectively receives electrical signals from the pixels in the one row during the first pass and from the pixels in the other row during the second successive pass.

3. The optoelectronic device of claim 1 wherein the scanning control circuit selectively receives electrical signals from the pixels in one row having pixels of a

first height during the first pass and from the pixels in another row having pixels of a second height, different than the first height, during the second successive pass.

4. The optoelectronic device of claim 1 wherein the scanning control circuit selectively receives electrical signals from the pixels in a first number of rows having a cumulative first height during the first pass and from the pixels in a second number of rows having a cumulative second height, different than the cumulative first height, during the second successive pass.

5. The optoelectronic device of claim 1 wherein the scanning control circuit selectively receives electrical signals from the pixels in a first number of rows having a cumulative first height during the first pass and the scanning control circuit selectively receives electrical signals from the pixels in a second number of rows having a cumulative second height, different than the cumulative first height, during the second successive pass, the number of rows in the second number of rows being different than the number of rows in the first number of rows.

6. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine a new height for the sets of pixels after each pass based on at least one of: i) at least one previously measured value of at least one parameter representing a quality of a previously acquired image and ii) at least one item of information resulting from a decoding of an image of a symbol acquired in a previous pass.

7. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine a new height for the sets of pixels after each pass based on at least one previously measured value of at least one parameter representing a quality of an image of a symbol acquired by the optoelectronic device, the quality selected from: a maximum spatial frequency of the image in the scanning direction, a maximum intensity of at least one category of symbol element in the image, a minimum intensity of at least one category of symbol element in the image, and a contrast of at least one category of symbol element in the image.

8. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine a new height for the sets of pixels after each pass based on a rotational sensitivity to maximize a field of depth for the two-dimensional sensor.

9. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine, after each pass, a measured value of a maximum spatial frequency of an image in the scanning direction, and an optimized value of a height for the sets of pixels in the direction perpendicular to the scanning direction based on an affine function of an inverse of a measured value of a maximum frequency for an image of a symbol in the scanning direction.

10. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine an optimized value of a height for the sets of pixels in the direction perpendicular to the scanning direction based on at least one function having at least one parameter having a value determined at least in part by a type of symbol to be acquired.

11. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine, after at least one pass, a type for a symbol to be acquired and a parametric coefficient based on the determined type.

12. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine an optimized value of a height of the sets of pixels in the direction perpendicular to the scanning direction according to a function parameterized by a predefined value of a maximum permitted angular deviation of the two-dimensional sensor around an optical axis relative to a symbol to be acquired.

13. The optoelectronic device of claim 1 wherein the scanning control circuit includes a processor programmed to determine an optimized value of a height of

the sets of pixels in the direction perpendicular to the scanning direction based on a measured value of a contrast of at least one category of symbol elements from an image.

14. A method of operating an optoelectronic device to acquire bichromatic machine-readable symbols, the optoelectronic device including a two-dimensional sensor having a plurality of pixels each capable of transmitting electrical signals representing a quantity of light incident on the respective pixel, the pixels arranged in a plurality of rows, the pixels in each of the rows extending in a scanning direction, and the plurality of rows arranged in a direction perpendicular to the scanning direction with respect to one another, the method comprising:

receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a first pass along the rows, where the sets of the pixels extend across at least one row in the direction perpendicular to the scanning direction and each set of pixels has a first height in the direction perpendicular to the scanning direction during the first pass; and

receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a second pass along the rows, the second pass successively following the first pass, where the sets of the pixels extend across at least one row in the direction perpendicular to the scanning direction and each set of pixels has a second height in the direction perpendicular to the scanning direction during the second pass, the second height different from the first height.

15. The method of claim 14 wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a first pass along the rows includes: receiving electrical signals from the pixels in at least one row, each pixel in the one row having a same height dimension in the direction perpendicular to the scanning direction, and wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a second pass along the rows includes: receiving electrical signals from the pixels in at least another row, each of the pixels in the other row having a same height dimension in the direction perpendicular to the scanning direction, where the height dimension of the pixels in the one row is different from the height dimension of the pixels in the other row.

16. The method of claim 14 wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a first pass along the rows includes: receiving electrical signals from the pixels in at least one row having pixels of a first height during the first pass, and wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a second pass along the rows includes receiving electrical signals from the pixels in at least another row having pixels of a second height, different than the first height, during the second successive pass.

17. The method of claim 14 wherein receiving electrical signals from successive ones of the sets of pixels along the rows in the scanning direction in at least a first pass includes: receiving electrical signals from the pixels in a first number of rows having a cumulative first height in the direction perpendicular to the scanning direction during the first pass, and wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a second pass along the rows includes: receiving electrical signals from the pixels in a second number of rows having a cumulative second height in the direction perpendicular to the scanning direction during the second successive pass, the cumulative second height different than the cumulative first height.

18. The method of claim 14 wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a first pass along the rows includes: receiving electrical signals from the pixels in a first number of rows having a cumulative first height during the first pass, and wherein receiving electrical signals from successive sets of the pixels along the rows in the scanning direction in at least a second pass along the rows includes: receiving electrical signals from the pixels in a second number of rows having a cumulative second height during the second successive pass, the cumulative second height different than the cumulative first height and the number of rows in the second number of rows being different than the number of rows in the first number of rows.

19. The method of claim 14, further comprising:

determining a new height for the sets of pixels after each pass based on at least one of: i) at least one previously measured value of at least one parameter representing a quality of a previously acquired image and ii) at least one item of information resulting from a decoding of an image of a symbol acquired in a previous pass.

20. The method of claim 14, further comprising:

determining a new height for the sets of pixels after each pass based on at least one previously measured value of at least one parameter representing a quality of an image of a symbol acquired by the optoelectronic device, the quality selected from: a maximum spatial frequency of the image in the scanning direction, a maximum intensity of at least one category of symbol element in the image, a minimum intensity of at least one category of symbol element in the image, and a contrast of at least one category of symbol element in the image.

21. The method of claim 14, further comprising:

determining a new height for the sets of pixels after each pass based on a rotational sensitivity to maximize a field of depth for the two-dimensional sensor.

22. The method of claim 14, further comprising:

determining, after each pass, a measured value of a maximum spatial frequency of an image in the scanning direction, and an optimized value of a height for the sets of pixels in the direction perpendicular to the scanning direction based on an affine function of an inverse of a measured value of a maximum frequency for an image of a symbol in the scanning direction.

23. The method of claim 14, further comprising:

determining an optimized value of a height for the sets of pixels in the direction perpendicular to the scanning direction based on at least one function having

at least one parameter having a value determined at least in part by a type of symbol to be acquired.

24. The method of claim 14, further comprising:

determining, after at least one pass, a type for a symbol to be acquired and a parametric coefficient based on the determined type.

25. The method of claim 14, further comprising:

determining an optimized value of a height of the sets of pixels in the direction perpendicular to the scanning direction according to a function parameterized by a predefined value of a maximum permitted angular deviation of the two-dimensional sensor around an optical axis relative to a symbol to be acquired.

26. The method of claim 14, further comprising:

determining an optimized value of a height of the sets of pixels in the direction perpendicular to the scanning direction based on a measured value of a contrast of at least one category of symbol elements from an image.

27. An optoelectronic device for acquiring bichromatic bar codes comprising:

a reading window,

sensor means with electronic scanning comprising a two-dimensional sensor comprising a plurality of individual detectors, known as pixels, transmitting electrical signals representing the quantity of light which they receive, the sensor means being adapted to carry out electronic scanning of at least a portion, known as scanned portion, of this two-dimensional sensor in a direction, known as scanning direction XX', the pixels of the two-dimensional sensor being ordered in a plurality of h rows juxtaposed in a direction, known as direction YY', perpendicular to the scanning direction XX', the two-dimensional sensor extending in the direction YY' over a height greater than a pixel, the scanned portion having a dimension in the direction YY', known as height Hy, which is constant during each scanning operation, from one side to the other of the two-dimensional sensor in the scanning direction XX', optical means adapted to form, at

least on the scanned portion of the two-dimensional sensor, an image of a code to be acquired located opposite the reading window,
wherein, in order to acquire a code placed opposite the reading window, the sensor means are adapted to carry out at least two scanning operations and to modify, between at least two successive scanning operations, the height Hy of the scanned portion of the two-dimensional sensor.

28. The device as claimed in claim 27, wherein each row is formed by pixels all having the same dimension in this row in direction YY', known as height pyj, wherein the pixel height pyj of at least one row of the two-dimensional sensor is different from that of the pixels of at least one other row of the two-dimensional sensor and wherein, in order to modify the height Hy of the scanned portion, the sensor means are adapted to carry out at least one scanning operation, known as first scanning operation, with at least one row of pixels and at least one further scanning operation, known as second scanning operation, with at least one row having a pixel height pyj different from that of at least one row of the first scanning operation.

29. The device as claimed in claim 27, comprising electronic processing means adapted, during each reading of a code to be acquired:

to control the scanning operations by the sensor in the scanning direction XX' and receive the electrical signals issuing from the pixels,

to execute a predetermined decoding protocol in order to obtain the value of information represented by the code,

wherein the sensor means are adapted to, after each scanning operation, execute treatment to optimize the height Hy in order to improve the results of the subsequent scanning stage and reduce the number of scanning stages required for decoding, wherein, during this optimization treatment, an optimized value of the height Hy which is to be used during a subsequent scanning operation is determined as a function:

of at least one previously measured value of at least one parameter representing the quality of the image acquired by the sensor means,

and/or of at least one item of information issuing from a previously executed decoding stage,

and wherein the sensor means are adapted to record the optimized value of the height Hy determined in this way to be used during a subsequent scanning operation.

30. The device as claimed in claim 27, wherein a dimension li of a diaphragm in a direction II' selected from the scanning direction XX' or the direction YY' is roughly but greater than:

$$\kappa.\lambda.f(1+mi)/pi.Nmini$$

wherein λ is the wavelength of the lighting means,

f is the focal length of the optical means,

mi is the magnification of the optical means in the direction II',

pi is the dimension of the pixels of the sensor means in the direction II',

Nmini is the minimum number of successive pixels in the direction II' which have to be contained in the image of a code element on the sensor to allow the decoding thereof,

k is a form factor of the diaphragm.

31. In an optoelectronic device for acquiring bichromatic bar codes comprising:

a reading window,

sensor means with electronic scanning in a global direction, known as scanning direction XX' comprising a plurality of individual light detectors, known as pixels, transmitting electrical signals representing the quantity of light which they receive, these sensor means comprising a two-dimensional sensor of which the pixels are ordered in a plurality of h rows juxtaposed in a direction, known as direction YY', perpendicular to the scanning direction XX', this two-dimensional sensor extending perpendicularly to the scanning direction XX' over a height greater than a pixel, the sensor means being adapted to carry out electronic scanning of at least a portion, known as scanned portion, of this two-dimensional sensor having a dimension in the direction YY', known as height

Hy, which is constant during each scanning operation, from one side to the other of the two-dimensional sensor in the scanning direction XX',

optical means adapted to form, on the sensor means, an image of a code to be acquired located opposite the reading window,

a process for acquiring bichromatic bar codes, wherein, in order to acquire a code placed opposite the reading window, at least two scanning operations are carried out and, between at least two successive scanning operations, the height Hy of the scanned portion of the two-dimensional sensor is modified.

32. The process as claimed in claim 31, wherein each row is formed by pixels all having the same dimension in this row in direction YY', known as height pyj, wherein the pixel height pyj of at least one row of the two-dimensional sensor is different from that of the pixels of at least one other row of the two-dimensional sensor and wherein, in order to modify the height Hy of the scanned portion, the sensor means are adapted to carry out at least one scanning operation, known as first scanning operation, with at least one row of pixels and at least one further scanning operation, known as second scanning operation, with at least one row having a pixel height pyj different from that of at least one row of the first scanning operation.

33. The process as claimed in claim 31, in which, during each reading of a code to be acquired:

the scanning operations by the sensor means in the scanning direction XX' is controlled and the electrical signals issuing from the pixels are received,

a predetermined decoding protocol is executed in order to obtain the value of information represented by the code,

wherein, after each scanning operation, a treatment to optimize the height Hy is executed to improve the results of the subsequent scanning stage and reduce the number of scanning stages required for decoding, in that during this optimization treatment, an optimized value of the height Hy which is to be used during a subsequent scanning operation is determined as a function:

of at least one previously measured value of at least one parameter representing the quality of the image acquired by the sensor means,

and/or at least one item of information issuing from a previously executed decoding stage,
and wherein the optimized value of the height Hy determined in this way to be used during a subsequent scanning operation is recorded.